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DEVELOPING INFORMATION TECHNOLOGY ACTIVITY SYSTEM FOR EFFECTIVE MANAGEMENT: A STUDY IN INONU UNIVERSITY

ETKİN YÖNETİM İÇİN BİLİŞİM TEKNOLOJİSİ ETKİNLİK SİSTEMİNİN GELİŞTİRİLMESİ: İNÖNÜ ÜNİVERSİTESİ'NDE BİR ARAŞTIRMA

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ABSTRACT

The research was carried out to improve "an information technology activity system" for more effective management of an institution. Researcher has developed the system based on activity theory and put the information technology (IT) onto the system as tools. Research was performed at the Inoni University. She collected data about IT using questionnaire. A total of 457 questionnaire forms were evaluated. The data was analyzed using factor analysis, reliability analysis, correlation analysis, t–test, and variance analysis. She has developed "IT skill scale", "IT attitude scale", and "IT use scale" as a result of factor analysis. She has found a high level positive correlation between "intermediate level IT skill" and "advanced level IT skill" and a high level negative correlation between "intermediate level IT skill" and "negative attitude towards IT". Finally, she has found significant differences between scores from scales by the participants' demographic characteristics.

ÖZET

Araştırma, bir kurumun daha etkin yönetilebilmesi için "bilişim teknolojisi etkinlik sistemi" geliştirmek amacıyla yapılmıştır. Araştırmacı, sistemi etkinlik teorisine dayanarak geliştirdi ve BT'ni etkinlik sistemine araçlar olarak yerleştirdi. Araştırma İnönü Üniversitesi'nde uygulandı. Araştırmacı, BT'yle ilgili veriyi anket yöntemiyle toplamıştır. Toplam 457 anket değerlendirilmiştir. Araştırmacı, verilerin değerlendirilmesinde faktör analizi, güvenilirlik analizi, korelasyon analizi, T-testi ve varyans analizini kullanmıştır. Araştırmacı, faktör analizinin sonucunda "BT beceri ölçeği", "BT tutum ölçeği" ve "BT'nin kullanım alanları ölçeği" geliştirmiştir. Korelasyon analizi sonucunda ise "orta düzey BT becerisi" ve "orta üstü BT becerisi" arasında yüksek düzeyli pozitif bir ilişki bulmuştur. Ayrıca "orta düzey BT becerisi" ile "BT'ne karşı negatif tutum" arasında yüksek düzeyde

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negatif bir ilişki görmüştür. Son olarak BT için geliştirilen ölçeklerde katılımcıların demografik özelliklerine göre önemli farklılıklar saptamıştır.

Activity Theory, Information Technology, Management
Etkinlik Teorisi, Bilişim Teknolojisi, Yönetim

1. INTRODUCTION

The 'globalization', 'accelerating importance of information', and 'technological changes and developments' have gradually increased the significance of IT in terms of institutions. IT is now used in many areas ranging from simple tasks and processes to performing managerial functions having strategic nature in institutions. In other words, IT helps managers in performing managerial functions such as planning, controlling, information gathering, and decision-making.

When the role of IT is considered in terms of universities, it is important not only for the managers and the administrative staff but also for the academic staff. However, it is likely to say that some educational institutions do not use IT effectively because there are some problems preventing the proper use of IT. While some of these problems have arisen from institutions themselves, some of them are due to the employees who use IT.

The researcher' main rationale for doing such a research was the relative importance of IT for the 21st century institutions. In the past, many researches were done concerning IT. Some results from researches carried on so far are as follows: Since the late 1980s, conducting researches on attitudes towards computers has been extremely popular. However, the attitudes towards IT have changed over the last years because of the increasing use of computers and the rapid developments in computer-related mechanisms. In the researches conducted in 1986s, it was found that the attitudes towards IT differentiated according to gender. The difference was suggested that men had more positive attitudes towards IT than women, and therefore men had more skills and experience than women (Brosnan, 1998: 559-577). Chen (2005) explains this gender gap with a socialization process that men are encouraged more than women to use computers and work with PCs. No significant difference has been observed between men and women in terms of attitudes towards computer in the researches undertaken since 2005 (Popovich et al., 2008: 986-992; Chen, 2005: 114; Oosterwegel et al., 2004: 215-233; Meelissen and Drent, 2008: 969-1085). In addition to attitude towards IT, the researches related to computer skill were conducted as well. In one research (Reed, 1998) a negative correlation was found between the age and computer skills. This correlation implies that the older the people get, the less their IT - related cognitive and physical skills decrease (Reed, 1998: 74).

On the other hand, Chen (2005: 30) found in his research that the computer fear was related to age. Also the research demonstrated that people having more computer experience were less fearful. In another research, it

was found that people's attitudes towards computer did not differ according to their educational status (Velasquez, 2002: 114). Finally, it was found that there was a positive correlation between average skill level and the attitudes towards computers (Chen, 2005: 4).

As shown in the literature review, many researches have been conducted in order to examine whether the participants' demographic characteristics have an effect on their IT skills and attitudes towards IT or not. First of all, this study mainly differs from previous ones in the idea of investigating in which areas staff can use IT. Secondly, previous studies generally focused on gender, age and educational variables. In this research, IT was evaluated, in addition to these variables, with the cadre status which was not encountered with in the previously conducted researches. As a last one, in this research, IT was examined in connection with the activity theory, which might make the study original. Information Technology Activity System (ITAS) has been formed based on this theory and the position of IT in this system has been determined. The activity theory has not completely been searched in terms of both application and theoretical aspects in management literature. There is a significant deficiency in the literature in this field. The activity theory, however, is considerably important in order to have an integrated approach towards events and problems. It's possible that this research is able to contribute to fill the relevant deficiency.

In conclusion, the researcher developed ITAS in the context of activity theory. She determined the location of IT within this system. In addition she developed the scales about IT and evaluated correlations among subscales. Finally, she found that there were significant differences between participants' attitudes towards IT, IT skills and IT use according to the participants' demographic characteristics.

2. THEORETICAL FRAMEWORK

The theoretical structure of this study, which is related with information technology and effective management, is based on the analysis of activity theory and activity system.

2.1. Activity Theory

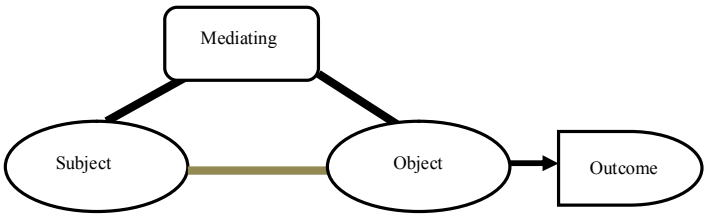
Activity Theory (AT) builds on the work of Vygotsky (1978: 68), and conceptualises as involving a subject, an object and tools (mediating artefacts). AT is now increasingly being used to study a variety of contexts, which involve technology. AT emphasises naturalistic study, culture and history. Nardi (1996: 7), who was instrumental in the introduction of AT into Human – Computer Interaction (HCI) contrasts AT with traditional research as a means of coping with problems like context, situation, and practice. Activity theory focuses on the activities, in which people are engaged, the nature of the tools they use in those activities, the social and contextual relationships among the collaborators in those activities, the goals and

intentions of those activities, and the objects or outcomes of those activities (Engestrom, 1994: 43-61).

The unit analysis is activity and the goal is to analyze the activity systems for their components and the dynamic reciprocal relations among them. Kuutti (1996: 27) defined activity as *"a form of doing directed to an object, and activities are distinguished from each other according to their object"*. Activities include goals, means (tools), the process of molding the object, and the results, subjects transform objects and the subjects change and develop themselves (Davydov, 1999: 39-52).

An activity is motivated by the need to transform the object into an outcome. The object and the motive can change during an activity. The relationship between the subject and the object of activity is mediated by a tool. This tool has the history of the developing relationship and can be either a material object or a tool for thinking. Figure 1 represents this system. However, the activity represented in Figure 1 cannot deal with the relations between an individual and his or her environment in an activity (Issroff and Scanlon, 2002: 77-83).

Figure 1: Vygotsky's Basic Mediation Triangle



(Engestrom, 1987: 78).

Vygotsky's basic triangle (Cole, 1996) has been traditionally identified as the basic structure for mediated action in Figure 1. The subject is the individual or individuals engaged in the mediated action, the mediating tool includes artifacts, social others, and prior knowledge of the subject. The object is the goal of the activity. This triangular representation of mediated action was Vygotsky's attempt to explain human development that did not rely on the stimulus-response association advocated by the growing behaviorist movement of his time (Lim, 2002: 411-421). It must be noted that mediated action does not only represent the mediation of human activity through tools, it is easy to conclude that tools are the single mediator in an activity; however, mediated action entails the subject, object, and tool mediating on another (Engestrom, 2001: 133-156). The subject, object, and tool have a synergistic relationship with one another, where each of them can mediate each other and affect the entire activity (Cole, 1996). Therefore, mediated action is a transformation process, not only for the subject but also for the tool and object as well (Lim, 2002: 411-421). Post Vygotskian sociocultural theorists took Vygotsky's mediated action as their basic

framework and have continued to contribute to the theoretical development of activity theory.

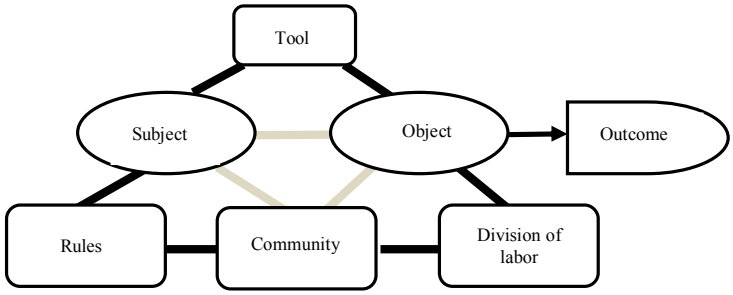
2.2. Activity System

To further develop the theoretical framework implicit in activity theory Engestrom (1987: 39) used the following four criteria for developing a viable root model of human activity: First, activity must be pictured in its simplest, genetically original structural form, as the smallest unit that still preserves the essential unity and quality between any complex activities. Second, activity must be analyzable in its dynamic and transformations (Lim, 2002: 411-421), in its evolution and historical change. Third, activity must be analyzable as a ecological phenomenon. The models will have to concentrate on systemic relations between the individual and external world. Fourth, specifically, human activity must be analyzable as culturally mediated phenomenon. The result of Engestrom's theoretical research was the development of activity system. The broad view of activity depicted in this conceptual diagram (in Figure 2) allows for the analysis of the relationships among the different components within the system and with other systems, but buttressed on activity as emerging from the systemic whole (Engestrom, 1987: 78). Vygotsky's original mediational model in the upper part of the diagram (in Figure 2) shows the relationships among subject, mediating artifacts, and object, to illustrate how a person has to make use of socially constructed artifacts to mediate her actions in order to achieve an object. Therefore, the foundation of activity systems is mediated action. The subject is the individual or groups of individuals involved in the activity. The activity of the subject is directed towards the object that is then *"moulded and transformed into outcomes with the help of physical and symbolic external and internal tools (mediating instruments and signs)"* (Engestrom, 1993: 53-72). The tool includes social others and artifacts that act as psychological or technical tools, and the object is the *"raw material"* or *"problem space"* that gives reasons for the subject to participate in the activity. Additionally, the artifacts, which operate as tools, are not conveniently handed to the subject. They are invented, purchased, discarded, and replaced in the activity system, and can even be, sources of disruptions (Engestrom and Middleton, 1996: 1-14). The tools through which the subject interacts with the world are dependent on his/her object in the activity system, and this shapes his/her interpretation of the tools. The subject exists in a community comprising of other individuals and subgroups that share the same general object. In the community, there is division of labour with the *"continuously negotiated distribution of tasks, powers, and responsibilities among the participants of the activity system"* (Cole and Engestrom, 1993: 7). The relations between the subject and community are mediated by the community's collection of mediating tools and rules (Engestrom, 1993: 67).

The model of activity system is dynamic (Kaptelinin, 1996a: 48); there are continuous constructions and re-constructions between its components. For example, there are ongoing negotiation and reformulation of rules by the subject rather than subject abiding by fixed rules. The tools are

continuously reconstructed or new tools developed by both the subject and his/her community to meet the object of the activity system. The division of labour is always in the process of redefinition and refinement by the subject and his/her community. Even the object is constantly in transition and under construction, and *"it manifests itself in different forms for different participants and at different moments of the activity"* (Hasu and Engestrom, 1999: 4).

Figure 2. Engestrom's Activity System



(Engestrom, 1987: 78)

The bottom part of the diagram depicts the social context in which mediated activity takes place. It includes the community to which a person belongs, the division of labor in the community, and the rules that guide the activity of its members. Rules are explicit and implicit norms, conventions and social relations within a community. The community is the social group that the subject identifies being a member of while exercising the activity. The division of labor refers to how the tasks are shared among the community. All of the above components of activity systems, including the top triangle and the bottom socio-historical components, can mediate change not only for the object but also for each other. In the attainment of the object, activity systems are molded or transformed into outcomes (Engestrom, 1993: 64-103).

Activity theory uses the term contradiction to indicate a misfit within components, between them, between different activities, or between diffent developmental phases of a single activity. Contradictions manifest themselves as problems, ruptures, breakdowns, clashes. Activity theory sees contradictions as sources of development; activities are virtually always in the process of working through contradictions (Kuutti, 1996: 34).

2.3. Information Technology (IT)

IT is a comprehensive concept covering both communication technology and computer technology. Molloy and Schwenk (1995: 283-311) define IT as processing the data which constitutes the source of science. According to them it is also used regularly as a means of communication particularly in technical, economic and social fields with the help of electronic machines.

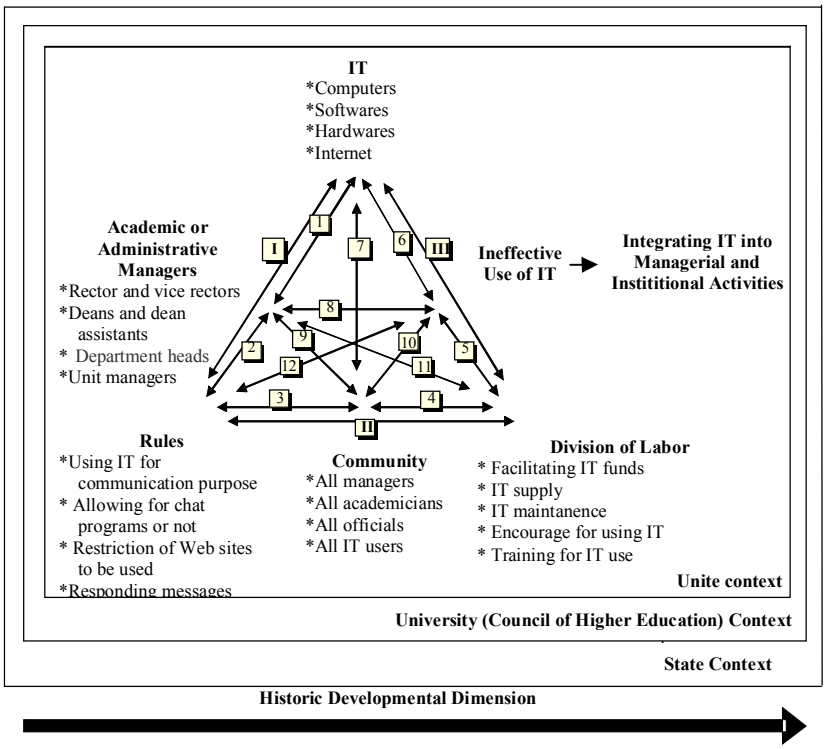
In this research, IT has especially been examined in terms of computer technology. Therefore, IT can be defined as computer-based technology with the aim of accessing, processing, keeping and transmitting the information. Computer system mainly consists of *"hardware"* and *"software"*. However, the Internet has recently become an important integral part of IT.

Hardware expresses different tools and equipments consisting of the physical structure of computers. Hardware consists of physical units such as terminal, keyboard, screen, hard disk, and printer. Software is the other main component of computer system. In general, the software means all commands intended for hardware. Computer terminals and other hardware tools do not work on their own. Software gives them life and put into action in line with specific tasks. This is realized with complex and various computer programs (Davis, 2007: 1-9). The Internet is a computer network allowing millions of computer networks for communicating with each other and sharing information resources within the framework of a common protocol worlwide. The most important feature of the Internet is to provide interactive communication rather than personal contact (Boudreau, 2007: 1-22).

2.4. Developing An Information Technology Activity System for Effective Management

In the information age all institutions and organisations are no longer able to execute organizational activities without IT support. Today IT is used in many areas ranging from very simple tasks to the operations with complex attributes. Therefore the researcher intended to identify areas of using IT in Inonu University as a public institution. In this context, Information Technology Activity System (ITAS) was formed based on activity theory and place of the computer was determined within this system. Figure 3 represents components in ITAS established for Inonu University according to activity theory.

Figure 3: Information Technology Activity System



As represented in Figure 3, computers, hardwares, softwares, and the Internet within the scope of IT locate as tools at the top of activity system (Ok et al., 2007). IT as a tool is the focal point of the study. In activity system, tools play a major role for overcoming problems that constitute the object and attaining the goal. In addition, the main feature of tools is that they have a mediating role (Engeström, 1991).

The subject of ITAS is managerial staff working at academic and administrative leadership positions at university. Managerial staff include the rector, vice rectors, deans, dean assistants, department heads, and unit managers. Managers have a direct effect on individuals in achieving multi-purposive and greater use of IT. Furthermore, managers are the ones that have the authority and responsibility in organizing and encouraging the use of IT within activity system for management, communication and education purposes. Subject determines who will play which roles, which jobs to do, and what the authority and responsibilities to undertake in determining rules regarding the use of IT and in converting outcome of the object. Through activity, the subject not only changes the situation but also improves himself / herself. Because activity system is based on reciprocal interaction, IT plays a major role in providing communication among components. In the process of reciprocal interaction the tool and the outcomes of action are changed, which in turn changes the subject (Bedny and Karwowski, 2007: 9). In brief,

managers undertake important tasks in achieving system's goal and solving problems related IT.

The object indicates the status of ineffective use of IT in institutions. In order words, it points problems out that adversely affect activities existing within system. The purpose of the institution is to integrate IT with organizational activitites by solving these problems. Managers, academicians, and administrative staff can use IT more effectively for the management, training, communication, and fuctional purposes. Firstly in this study the researcher explored the question of *"Which purposes IT has been used for?"*. Then she revealed the existing situation. Finally she investigated the constraints that may prevent more efficient use of IT.

Community is a group composed of people who work at all departments in Inonu University. Therefore all staff employed in these departments -managers, academicians, administrative staff, and the all other IT users- are community's members. It is important to emphasize that managers as the subject are community's members at the same time. Each member of the community contributes directly or indirectly to achieve the purpose of the system.

Rules are regulations that the management make in order to use IT more effectively. They express various limits to be imposed for use of computers. In order to use IT more effectively, the rules imposed by management are as follows: For instance, using IT for communication purpose, whether or not to allow instant messaging programs, restriction of Web sites to be used etc. Rules have changed and evolved based on historical development process and the tools used. If the rules are determined by the tools, the tools may contribute more to achieve the goal. Otherwise, the various contradictions which arise from components themselves or the interaction among components may emerge. When it is necessary to establish the interaction between the subject and community's members, the rules play mediating role between these two components.

Labor division refers to distribution of jobs that are necessary for continuing on activities of the system, of authority and responsibility staff use while performing these activities. In this activity system labor division can be stated as *"facilitating IT funds"*, *"IT supply"*, *"IT maintanence"*, *"encourage for using IT"*, and *"training for IT use"*.

Like all systems, ITAS has an environment. However, ITAS is an open system that has the continuous and reciprocal interactions with its external environment. To consider ITAS independently from its environment may lead to failure the institution and adversely affect its activities. Environments which this system is directly related to are institution's environment and goverment environment that covers Council of Higher Education.

Finally the historical development dimension of ITAS takes account of not only the current moment but also the past. Historical analysis of the development is often needed in order to understand the current situation

(Kuutti, 1996: 26). If one of the system's components is examined within historical dimension, the other components need to change depending on the situation in the past as well. For instance, in this study, if the researcher considers IT or computers as tool, she has to determine the system components like the rules, the labor division, the object, and the others according to that component.

If we deal with operation of the activity system, the subject and community members try to transform the object -accepted as a problem- into an outcome. During this activity they use the tools mediating their attempts. Tools also shape the goals of the people who use the tools (Latour, 1993). The use of a particular tool changes the structure of activity and can result in new goals to be satisfied (Kaptelinin, 1996a: 54). Rules and division of labor are regulations that restrict community members' behaviours and guide them. There is a permanent communication and interaction among components to achieve the goal. This communication exists only within system, also in interaction with exterior environment.

Activity theory uses the concept of contradiction to indicate a misfit within the components, between them, between the different activities, or between different developmental phases of a single activity. Contradictions emerge in the forms of problems, ruptures, breakdowns, and conflicts. Activity theory takes contradictions as sources of development; activities are virtually always in the process of working through contradictions (Kuutti, 1996: 34). Contradictions sometimes can arise from components itself or interaction among components within the system. Moreover, some contradictions arise from communication with external environment. For instance, entry of IT into an activity system can bring together the internal and external contradictions. These contradictions prevent the integration of IT in institution's activities efficiently; and this obstruction continues until AS' components become stable. In order to provide the integration of IT in the university's activities effectively, it may need to re-evaluate and redefine each component of AS. Therefore, it may be necessary to re-evaluate these contradictions as well. At the same time IT can change other components in different activity systems. In conclusion, the components of the system and other systems are reciprocally affected from every change originated in IT (Lim and Hang, 2003).

3. METHODOLOGY

3.1. The Aim of This Study

The aim of this study is to determine and define the place of IT activity system in a university management in order to develop effective communication between staff by tapping the shortcomings and activity units, to contribute to enhancement of effective management by offering new strategies based on findings. In this context the main research questions are as follows: What is the place of ITAS in a university management system? How can it and its sub-components be defined systematically in order to

promote maximum effective management? These generic questions can be specified in the following way:

(1) How can IT activity system be defined for a unit of analysis?

(2) Are there statistically significant differences among IT users depending upon various demographic characteristics (age, education, etc.)?

(3) What are the potential shortcomings preventing the maximum effectiveness?

(4) How can the effectiveness of IT system be enhanced for maximum benefit in management?

3.2. Methods / Instruments

In this study survey method by the use of questionnaire was employed. By the questionnaire items it is intended to measure the following variables: "*Information technology attitu*de scale", *"the areas of the use of IT scale"*, and *"IT skill scale"*.

While preparing questionnaire items, the researcher utilized *"computer attitude scale"* by Berberoğlu and Çalıkoğlu (1993); *"computer attitude scale"* by Francis, Katz, and Jones (2000), and *"attitude scale directed to use the Internet"* by Tavsancil and Keser (2002). While forming the scale, the researcher followed these steps: Firstly all scientific sources related IT were examined with great care. Then she investigated national and international scales related to IT. Finally, she interviewed with managers and officials about IT problems at Information Processing Unit in Inonu University. After this studies, she developed a scale consisting of 200 items. An expert scientist examined this scale. A 83-item scale emerged at the end of evaluation. The researcher conducted a pilot application on 50 participants. In the result of this pilot application, after correcting items that were not understood, she started to research.

3.3. The Research Population and Sample

This research was conducted at Inonu University in Malatya. Malatya Inonu University was founded in 1975. The researcher observed that there were many problems relating to IT (Information Processing Unit, technical staff and computer users) at the university. The solution of these problems is important in transition to information society. Moreover, in order to establish activity system it is necessary to exist some problems that need solving. Therefore, the researcher chose such a sample. The sample includes 23 managers, 146 administrative staff, and 278 academic staff which are selected via a mixture of convenience and random sampling method. The rest did not answer this question relating to cadre.

A total of 1086 academic staff and 1027 administrative staff worked in Inonu University in 2007. For this study, data was collected using a questionnaire and the respondents were asked to evaluate the IT system of Inonu University. The researcher delivered 600 questionnaires to IT users

and informed them about the study. 503 questionnaires were collected and 457 of them were evaluated. 46 ones had missing values (because of divergent values and because more than 10 % of items of scale was empty) and were excluded from the research. Thus, the population of this research was 2113 and the sample was 457. The return rate was 84 %.

3.4. Analysis of The Data

The data was analyzed in accordance with activity theory principles. According to activity theory principles, IT and its language system developed around it, is designed as a symbolic tool or mediator through which effective management in a university setting is actualized (Nardi, 1996: 10; Kaptelinin, 1996a: 46; Kaptelinin, 1996b: 110). Hypothetically, using IT is not mono-directional action by one person or a group of people, but an interactional activity between members of IT units, namely, managers, experts, IT unit, administrative staff, and academic staff. The object of activity system consists of problems either related to IT or the users of IT in institution. The aim of system is to determine and analyze these problems. If these problems are solved, then it may given some contributing to the effective management. The ultimate aim, thus, constitutes developing effective management employing above mentioned tools. In this activity system there are rules and communities to be obeyed by the related sides and division of labour among participating individuals. The historical development of ITAS in this specified context was explained to shed lights of its effect on its current condition.

The quantitative data which were obtained by the scales were intended to explain the ITAS by observing the developments and shortcomings in this visual map. SPSS program was used to analyze the data and the coding was as *"absolutely true=1, mostly true=2, partly true=3, false=4, absolutely false=5"*. Factor analysis, reliability analysis, and correlation analysis have been applied. In addition, T-test and analysis of variance have also been operationalized along with some other descriptive analysis. The researcher used factor analysis in order to classify items of the scale. She applied correlation analysis to find whether or not a relationship was between the scales. In addition, she used t-test and one-way ANOVA test to check differences between groups.

4. RESULTS

The researcher dealt with findings of the research in the context of the participants' demographic characteristics, IT scales, evaluation of scales according to the participants' demographic characteristics.

4.1. The Participants' Demographic Characteristics

The results of data analysis are introduced starting from the participants' demographic characteristics (Table 1).

Table 1: The Participants' Demographic Characteristics

Demographic Characteristics	n	%	Demographic Characteristics	n	%
Gender			**Age**		
Male	306	67	Between 20-28	71	16
Female	151	33	Between 29-35	104	23
Missing	0	0	Between 36-45	171	37
Total	**457**	**100**	Between 46-60	88	19
Language level			Missing	23	5
Very good	44	10	**Total**	**457**	**100**
Good	143	31	**Cadre**		
Intermediate	158	35	Academic staff	278	61
Poor	68	15	Administrative staff	146	32
Very poor	40	9	Both academic and managerial staff	23	5
Missing	4	1	Missing	10	2
Total	**457**	**100**	**Total**	**457**	**100**

As represented in Table 1, the analysis was performed based on the 457 participants. Of these, 151 were female and 306 were male, 16 % were aged 20-28 years old, 23 % were 29-35, 37 % were 36-45, 19 % were 46-60 years old. In distribution of participants, depending on cadre variable, rate of staff in academic cadre (61 %) was more than rate of staff in administrative cadre (32 %). According to language level, most of the participants had intermediate level and very few had low level (very poor).

4.2. Scales Related to Information Technology

The researcher used exploratory factor analysis while constituting IT subscales. She took into consideration the following criteria when evaluating the results of factor analysis:

- Eigenvalue of each factor should be at least one,
- Factor loadings of items in each factor should have at least .45 value,
- Items that loaded to each factor should be consistent in meaning and content,
- The difference between factor loadings of one item in multiple factors should be at least .10.

In this way, the researcher tried to increase the independence between the factors. She worked up *"information technology skill scale (ITSS)"*, *"information technology attitude scale (ITAS)"*, and *"information technology use scale (ITUS)"* as concerning information technology in her study.

4.2.1. Information Technology Skill Scale

The researcher chose a total of 17 items from variables in questionnaire in order to devolop *"information technology skill scale"*. Reliability analysis of these items is .94. In order to determine whether item is removed from scale or not when item is deleted, the researcher evaluated

changes in the alpha coefficients. When 28th and 34th items were removed from the scale, relability of the remaining 15 items rose to .95.

The researcher made initially KMO test in order to determine whether data obtained from sample is adequate or not. Kaiser states that if the value is close to 1, it is excellent (.90 is excellent, .80 is very good, .70 and .60 are medium, and .50 is bad); if it is below .50, it is not acceptable (Tavsancil, 2002). In this study the researcher found that the KMO coefficient was .95 in the first factor analysis. This value can be expressed as the highest value of the KMO (it is excellent because it is close to 1) that is recommended to perform factor analysis. Furthermore, Chi-Square value obtained by the Barlett test is significant (X^2=5439.362, Sd=105, p<.00). Both KMO result and Barlett test result show that the data is appropriate for factor analysis. In other words, the results of both analyses show that there are adequate level correlations among items to perform factor analysis on the sample.

The researcher applied principal component analysis and Kaiser criterian (factors whose eigenvalues are more than 1) (Lester and Bishop, 2000) in order to determine the possible factors of the scale. Moreover, in order to minimize high weighted variables falling to each factor, she applied Varimax Rotation Technique. She has noticed that the factor loadings of 29th and 36th items are lower than .45 in the result of initial factor analysis. In addition, she has found that the difference between load of 37th item with the other highest factor loading is lower than .10. Therefore she removed 29th, 36th, and 37th items from the scale. She has repeated factor analysis for the remaining 12 items in the scale. According to the results of this analysis, no item's factor loadings were observed to be lower than .45 and no items had high factor loads in more than one factor. Table 2 shows *"information technology skill scale"*.

Table 2: IT Skill Scale

Items	Factor Loadings	Eigenvalues	Variances	Cronbach's Alpha
Intermediate Level IT Skill Scale		7.22	35.70	.93
(39) Surfing on the Internet	.848			
(41) Searching a subject on the Internet	.844			
(40) Download file from the Internet	.830			
(38) Sending e-mail on WEB	.812			
(35) Sending e-mail by attaching file	.773			
Advanced Level IT Skill		1.23	34.75	.90
(27) I usually fix my computer when it broken down	.795			
(30) I can use the Excel program	.756			
(26) I can install Windows on my computer	.751			
(31) I can use Powerpoint and similar presentation programs	.696			
(32) I can create a table	.690			
(25) In general, I'm fine on the computer	.687			
(33) I can scan	.681			
Explained Total Variance: 70.45				

As represented in Table 2, the researcher determines the factors whose eigenvalues are greater than 1 in *"information tecnology skill scale (ITSS)*". The total variance, which these two factor have explained, is 70.45 %. 35.70 % of this value originates from first factor and 34.75 % from second factor. The load values in the first factor range from .77 to .85; the loadings in the second factor range from .68 and .80. After Varimax Rotation Technique, she identifies that the first factor comprises five items (39, 38, 40, 41, 35) and the second factor comprises seven items (27, 30, 26, 32, 31, 25, 33). Later, the researcher examined the contents of items and named the first factor *"intermediate level IT skill scale"*; and named the second factor *"advanced level IT skill scale"*. The internal consistency coefficients (Cronbach alpha) were calculated for reliability analysis of IT skill scales. The internal consistency coefficient alpha of *"intermediate level IT skill scale"* with five items is .93; the internal consistency coefficient of *"advanced level IT skill scale"* with seven items, was .90; and the internal consistency coefficient of overall scale with 12 items, was .94.

4.2.2. Information Technology Attitude Scale

The researcher has developed *"information technology attitude scale"* to assess attitudes of the university staff towards IT. In order to develop this scale, she determined a total of 18 items related to attitude from variables in the questionnaire. At first, reliability analysis of these items is .86. In order to determine whether item is removed from scale or not when item is deleted, the researcher evaluated changes in the alpha coefficients. When 55th, 56th, and 57th items were removed from the scale, relability of the remaining 15 items rose to.87.

The researcher made KMO test, based on 15 items, to determine whether data obtained from sample is adequate or not. After this analysis, KMO coefficient related to *"information technology attitude scale"* was .88. This value can be expressed as very good because it is close to the highest KMO value that is recommended to perform factor analysis. Furthermore, Chi-Square value obtained by Barlett test is significant (X^2=2412.364, Sd=105, p<.00). Both KMO and Barlett test results show data is appropriate for factor analysis.

The researcher applied principal component analysis and Kaiser criterian (factors whose eigenvalues are more than 1) (Lester and Bishop, 2000) in order to determine dimensions of scale. Moreover, in order to minimize high weighted variables falling to each factor, she applied Varimax Rotation Technique. After factor analysis, the researcher has noticed that 42nd and 44th items' factor loadings are lower than .45. She removed these items, whose factor loadings is low, from scale. Later she has repeated factor analysis for the remaining 13 items in the scale. According to the results of this analysis, no item's factor loadings is lower than .45, and any item isn't included in more than one factor. In addition, all items are compatible with each other in terms of content. Table 3 has shown results of factor analysis related to *"information technology attitude scale"*.

Table 3: IT Attitude Scale

Items	Factor Loadings	Eigenvalues	Variances	Cronbach's Alpha
Positive Attitude Towards IT		4.96	27.95	.83
(54) Internet increases my desire to do research	.764			
(53) Internet relieves teaching from monotony	.716			
(49) I feel very good when I use the computer	.691			
(52) I trust myself about working with computer	.648			
(58) Internet is the place where information is shared most easily	.628			
(47) Once I began to work with computer, it is very difficult to leave	.612			
(59) A life without computer is unthinkable in the modern world	.611			
(45) I think working with computers is enjoyable and stimulating	.581			
Negative Attitude Towards IT		1.84	24.42	.84
(50) I think I can not understand computer issues throughout my life		.846		
(51) Computers disturb me and confuse my mind		.836		
(48) I feel a tightness in my heart when I think of working with computers		.752		
(43) I am not good at all about using the computer		.704		
(46) I do not feel at all good things against the computer		.666		
Explained Total Variance: 52.37				

As represented in Table 3, two factors, whose eigenvalues are larger than 1, have been identified in this analysis. These two factors explain 52.37 % of the total variance. The first factor alone explained 27.95 % of total variance, and the factor loadings in the first factor ranged between .76 and .58 were observed. On the other hand the second factor alone explained 24.42 % of total variance, and the factor loadings in the second factor ranged between .85 and .67. After Varimax Rotation Technique, the first factor has composed of eight items (54, 53, 49, 52, 58, 47, 59, 45), and the second factor has composed of five items (50, 51, 48, 43, 46). Later, the researcher examined the contents of the items and gave the names of "*positive attitude towards IT"* to the first factor; *"negative attitude towards IT"* to the second factor. Internal consistency coefficients (Cronbach alpha) were calculated for reliability analysis of IT attitude scales. In *"positive attitude towards IT"* scale, which composed of 8 items, internal consistency coefficient is .83; in *"negative attitude towards IT scale"*, which composed of 5 items, internal consistency alpha coefficient is .84; and internal consistency alpha coefficient of the total scale, which composed of 13 items, is .86.

4.2.3. Information Technology Use Scale

"Information technology use scale (ITUS)" was developed in order to identify areas that the university staff use IT. For this purpose, the researcher identified the total 24 items related to IT use from variables in the questionnaire. The reliability analysis of these items is .84. The researcher look into changes in the alpha coefficients, when item is deleted, to determine whether items are removed from scale or not. When 61st, 62nd, and 73rd items were removed from the scale, the reliability of 21 items rised .85

The researcher conducted KMO test, based on 21 items, to determine whether data obtained from sample is adequate or not. As a result of this analysis, KMO coefficient related to ITUS is .80. This value can be evaluated as *"very good"* because it is close to 1, suggested the highest KMO value, that is necessary to carry out factor analysis. Furthermore, Chi-Square value (X^2=1835.523, Sd=210, p<.00) obtained by the Barlett test is significant. Both the KMO and the Barlett test results have shown data is appropriate for factor analysis.

The researcher applied principal component analysis and Kaiser criterian (factors whose eigenvalues greater than 1) (Lester and Bishop, 2000) to determine dimensions of scale. Moreover, in order to minimize items, which high loading ones that corresponding to each factor, she carried out Varimax Rotation Technique. In the result of factor analysis, she has noticed that the 60th and 75th items' factor loadings were lower than .45; the 70th and 72nd items are included in more than one factor. Removing these items from the scale, she repeated factor analysis. In the result of this analysis, no item's factor loadings are lower than .45, and any item isn't included in more than one factor. In addition, items are compatible with each other in terms of content. Consequently, three factors, whose eigenvalues are greater than 1, were found. Table 4 has shown the results of factor analysis related to ITUS.

Table 4: IT Use Scale

Items	Factor Loadings	Eigenvalues	Variances	Cronbach's Alpha
The Use of IT for Practice / Entertainment Purpose		4.94	21.90	.82
(80) Playing game on the Internet	.735			
(81) Shopping on the Internet	.725			
(78) Watching a movie on the computer	.696			
(76) Putting an advert on the Internet	.677			
(82) Meeting people on the Internet	.663			
(77) Listening to music on the Internet	.639			
(79) Following up the press on the Internet	.535			
(74) The Internet banking (EFT, money order, currency exchange, stock market etc.)	.503			
(83) Communicating with e-mail	.459			
The Use of IT for Management Purpose		2.38	15.87	.81
(67) The Internet has an indispensable function in administrative activities		.863		
(68) The Internet communication should be more effective in the upper units		.857		
(69) The Internet use has an important function in managerial activities		.806		
(71) Some documents / paperwork jobs can be done more fastly via the Internet		.610		
The Use of IT for Education Purpose		1.76	15.64	.76
(65) My students interview with me via e-mail			.851	
(66) I communicate with my students via the Internet			.775	
(64) I tell my lectures with the projector (powerpoint) when necessary			.744	
(63) I benefit from the Internet resources in educational activities			.632	
Explained Total Variance: 53.41				

As represented in Table 4, the three factors, whose eigenvalues are greater than 1, were determined in this analysis. These two factors explain 53.41% of the total variance. The first factor alone explains 21.90 % of the total variance, and the factor loadings in the first factor range between .74 and .46. The second factor alone explains 15.87 % of the total variance, and the factor loadings in the second factor range between .86 and .61. The third factor alone explains 15.64 % of the total variance, and the factor loadings in the third factor range between .85 and .63. After Varimax Rotation Technique, the first factor has composed of nine items (80, 81, 78, 76, 82, 77, 79, 74, 83); the second factor has composed of four items (67, 68, 69, 71), and the third factor has composed of four items (65, 66, 64, 63). Later, the researcher examined the contents of items and gave the names of *"the use of IT for practice / entertainment purpose"* to the first factor; *"the use of IT for management purpose"* to the second factor and; *"the use of IT for education purpose"* to the third factor. Internal consistency coefficients (Cronbach alpha) were calculated for reliability analysis of IT use areas scales. *"The use of IT for practice / entertainment purpose"* scale's, which composed of 9 items, internal consistency alpha coefficient is .82; *"the use of IT for management purpose"* scale's, which composed of 4 items, internal consistency alpha coefficient is .81; *"the use of IT for education purpose"* scale's, which composed of 4 items, internal consistency alpha coefficient is .76; and internal consistency alpha coefficient of the total scale, which composed of 17 items, is .84.

4.3. Correlation Analysis of The Scales

Table 5 has shown correlations among the scales of *"IT skill"*, *"IT attitude"*, and *"IT use areas"*.

Table 5: The Results of Correlation Analysis

Scales		**1**	**2**	**3**	**4**	**5**	**6**	**7**
Intermediate Level IT Skill Scale	Pearson Correlation	1.00	.705*	.430*	-.536*	.471*	.176*	.354*
	Sig. (2-tailed)	.	.00	.00	.00	.00	.001	.00
	N	457	457	457	457	455	347	358
Advanced Level IT Skill Scale	Pearson Correlation	.705*	1.00	.438*	.494*	.391*	.151*	.428*
	Sig. (2-tailed)	.00	.	.00	.00	.00	.005	.00
	N	457	457	457	457	455	347	358
Positive Attitude towards IT Scale	Pearson Correlation	.430*	.438*	1.00	-.460*	.328*	.375*	.422*
	Sig. (2-tailed)	.00	.00	.	.00	.00	.00	.00
	N	457	457	457	457	455	347	358
Negative Attitude towards IT Scale	Pearson Correlation	.536*	.494*	-.460*	1.00	.290*	.061	.161*
	Sig. (2-tailed)	.00	.00	.00	.	.00	.26	.002
	N	457	457	457	457	455	347	358
The Use of IT for Practice/ Entertainment Purpose Scale	Pearson Correlation	.471*	.391*	.328*	.290*	1.00	.281*	.377*
	Sig. (2-tailed)	.00	.00	.00	.00	.	.00	.00
	N	455	455	455	455	455	345	357
The Use of IT for Management Purpose Scale	Pearson Correlation	.176*	.151*	.375*	.061	.281*	1.00	.294*
	Sig. (2-tailed)	.001	.005	.00	.260	.00	.	.00
	N	347	347	347	347	345	347	248
The Use of IT for Education Purpose Scale	Pearson Correlation	.354*	.428*	.422*	.161*	.377*	.294*	1.00
	Sig. (2-tailed)	.00	.00	.00	.002	.00	.00	.
	N	358	358	358	358	357	248	358

*Correlation is significant at the 0.01 level (2-tailed)

1=Intermediate Level IT Skill Scale, 2=Advanced Level IT Skill Scale, 3= Positive Attitude Towards IT Scale, 4= Negative Attitude Towards IT Scale, 5= The Use of IT for Practice / Entertainment Purpose Scale, 6= The Use of IT for Management Purpose Scale, 7= The Use of IT for Education Purpose Scale

As represented in Table 5, there is a strong correlation between *"intermediate level IT skill"* and *"advanced level IT skill"* because of r= .71 and p< .01. When the *"intermediate level IT skill"* of staff increases, the *"advanced level IT skill"* of them has increased.

There is a strong correlation between *"intermediate level IT skill"* and *"negative attitude towards IT"* because of r= .54 and p< .01. When the *"intermediate level IT skill"* of staff increases, the *"negative attitude towards IT"* of them has decreased. There are a weak correlation among other variables.

According to Cohen (1988), a general guideline, a value ranging from .1 to .4 would be classed as a weak correlation, and anything above .5 would be regarded as a strong correlation. A value approaching zero indicates the absence of any relationship between two variables, in order words no correlation (Greasley, 2008: 80).

4.4. Evaluation of IT Scales by The Participants' Demographic Characteristics

In activity theory it is necessary to analyze the components of the system to reach an effective outcome. In this study especially tools, community, subject and object were examined. The means of the variables were used to inspect the differences between factor scales depending upon various demographic characteristics (age, education, etc.). Table 6 shows T-test results of IT scales by gender variable.

Tablo 6: T Test Results of IT Scales by Gender Variable

		N	Mean	S. D.	t	df	Sig.
Intermediate Level IT Skill	Male	306	2.1511	1.0604	1.464	455	.113
	Female	151	2.0017	.9537			
Advanced level IT Skill	Male	306	2.7340	1.0355	2.107	455	.006
	Female	151	2.9407	.8781			
Positive Attitude Towards IT	Male	306	2.0956	.6159	.487	455	.973
	Female	151	2.0647	.6799			
Negative Attitude Towards IT	Male	306	1.8730	.7005	.672	455	.747
	Female	151	1.8255	.7346			
The Use of IT for Entertainment Purpose	Male	306	3.3469	.8307	1.566	453	.352
	Female	149	3.4746	.7854			
The Use of IT for Management Purpose	Male	230	1.6330	.6005	.321	345	.352
	Female	117	1.6560	.6899			
The Use of IT for Education Purpose	Male	243	2.4136	.8485	.832	356	.687
	Female	115	2.4935	.8471			

As represented in Table 6, participants' *"advanced level IT skills"* indicate a significant difference by gender ($t = 2.107$, $p < .01$). According to

source of this difference, men have more *"advanced level IT skill"* than women. However, there are no significant differences at *"intermediate IT skill"* (t = 1.464, p < .05) , *"positive attitude towards IT"* (t = .487, p < .05), *"negative attitude towards IT"* (t = .672, p < .05), *"the use of IT for practice / entertainment purpose"* (t = 1.566, p < .05), *"the use of IT for management purpose"* (t = .321, p < .05), and *"the use of IT for education purpose"* (t = .832, p < .05) by gender.

Table 7 has shown One - Way ANOVA test results of IT scales by age variable.

Table 7: One -Way ANOVA Test Results of IT Scales by Age Variable

		N	Mean	S. D.	F	df	Sig.
Intermediate Level IT Skill	20 -28	71	1.7993	.9341	21.425	433	.000
	29 -35	104	1.8389	.8596			
	36 - 45	171	1.9474	.9232			
	46 - 60	88	2.7670	1.0338			
	Total	**434**	**2.0634**	**.9978**			
Advanced Level IT Skill	20 -28	71	2.5111	.8658	11.035	433	.000
	29 -35	104	2.6896	.9119			
	36 - 45	171	2.6739	.9948			
	46 - 60	88	3.2760	.9426			
	Total	**434**	**2.7731**	**.9769**			
Positive Attitude Towards IT	20 -28	71	2.0062	.7059	2.163	433	.092
	29 -35	104	2.1341	.5910			
	36 - 45	171	1.9975	.6382			
	46 - 60	88	2.1743	.5895			
	Total	**434**	**2.0675**	**.6319**			
Negative Attitude Towards IT	20 -28	71	2.1085	.7498	6.587	433	.000
	29 -35	104	1.7629	.6614			
	36 - 45	171	1.7577	.6154			
	46 - 60	88	1.7211	.6858			
	Total	**434**	**1.8249**	**.6867**			
The Use of IT for Entertainment Purpose	20 -28	70	3.1022	.9862	8.723	431	.000
	29 -35	104	3.3114	.7635			
	36 - 45	170	3.3172	.7862			
	46 - 60	88	3.7128	.6127			
	Total	**432**	**3.3615**	**.8066**			
The Use of IT for Management Purpose	20 -28	59	1.4068	.5188	3.222	326	.023
	29 -35	77	1.6494	.7235			
	36 - 45	125	1.6840	.5707			
	46 - 60	66	1.6894	.5982			
	Total	**327**	**1.6269**	**.6133**			
The Use of IT for Education Purpose	20 -28	51	2.0556	.7708	6.084	340	.000
	29 -35	83	2.6104	.8555			
	36 - 45	141	2.3670	.8148			
	46 - 60	66	2.6023	.8378			
	Total	**341**	**2.4252**	**.8413**			

As represented in Table 7, participants' *"positive attitudes towards IT"* don't indicate a significant difference by age F (3, 430 = 2.163, p > .05). However, there are significant differences at *"intermediate level IT skill"* F (3, 430 = 21.425, p < .001), *"advanced level IT skill"*, F (3, 430 = 11.035, p < .001), *"negative attitude towards IT"* F (3, 430 = 6.587, p < .001), *"the use of IT for practice / entertainment purpose"* F (3, 428 = 8.723, p < .001), *"the use of IT for management purpose"* F (3, 323 = 3.222, p < .05), and *"the use*

of IT for education purpose" F (3, 337 = 6.084, p < .001) by age. According to Scheffe test results, among age groups, the greatest difference is between 20-28 and 46-60 years old at scales having significant difference.

Table 8 has shown One-Way ANOVA test results of IT scales by education variable.

Table 8: One -Way ANOVA Test Results of IT Scales by Education Variable

		N	Mean	S. D.	F	df	Sig.
Intermediate Level IT Skill	High school	35	2.5429	1.1464	5.650	451	.000
	University	114	2.3114	1.1823			
	Master	95	1.9500	1.0037			
	Doctorate	179	1.8869	.7889			
	Other	25	2.4500	1.2011			
	Unanswered	4	2.9375	.5154			
	Total	**452**	**2.0985**	**1.0226**			
Advanced Level IT Skill	High school	35	3.0361	1.0245	2.341	451	.041
	University	114	2.9409	1.1000			
	Master	95	2.6526	.9603			
	Doctorate	179	2.6994	.9130			
	Other	25	2.9467	.8294			
	Unanswered	4	3.6071	1.1510			
	Total	**452**	**2.7983**	**.9868**			
Positive Attitude Towards IT	High school	35	2.0173	.5543	2.418	451	.035
	University	114	2.1067	.6560			
	Master	95	2.0113	.6090			
	Doctorate	179	2.0729	.6161			
	Other	25	2.1014	.4598			
	Unanswered	4	3.0625	.5052			
	Total	**452**	**2.0745**	**.6173**			
Negative Attitude Towards IT	High school	35	2.0743	.8459	2.011	451	.076
	University	114	1.9404	.7431			
	Master	95	1.7511	.6895			
	Doctorate	179	1.7832	.6374			
	Other	25	1.9540	.6598			
	Unanswered	4	2.0500	.5508			
	Total	**452**	**1.8504**	**.6983**			
The Use of IT for Entertainment Purpose	High school	35	3.7056	.9778	2.194	449	.054
	University	112	3.3538	.9122			
	Master	95	3.3135	.7673			
	Doctorate	179	3.3443	.6962			
	Other	25	3.7106	.9906			
	Unanswered	4	3.2847	.3870			
	Total	**450**	**3.3881**	**.8142**			
The Use of IT for Management Purpose	High school	35	1.5357	.5186	1.833	342	.106
	University	93	1.5385	.6373			
	Master	66	1.6439	.6593			
	Doctorate	121	1.7521	.5841			
	Other	24	1.5000	.4834			
	Unanswered	4	1.6250	.4330			
	Total	**343**	**1.6322**	**.6044**			
The Use of IT for Education Purpose	High school	12	2.2569	.9173	1.262	353	.280
	University	68	2.3272	.8970			
	Master	87	2.4598	.8455			
	Doctorate	177	2.5165	.8150			
	Other	8	2.2188	.8807			
	Unanswered	2	1.5000	.7071			
	Total	**354**	**2.4449**	**.8449**			

As represented in Table 8, there are no significant differences at *"negative attitude towards IT"* F (5, 446 = 2.011, p > .05), *"the use of IT for practice / entertainment purpose"* F (5, 446 = 2.194, p > .05), *"the use of IT for management purpose"* F (5, 337 = 1.833, p > .05), and *"the use of IT for education purpose"* F (5, 348 = 1.262, p > .05) by education of participants. However, there are significant differences at *"intermediate level IT skill"* F (5, 446 = 5.650, p < .001), *"advanced level IT skill"* F (5, 446 = 2.341, p < .05), *"positive attitude towards IT"* F (5, 446 = 2.418, p < .05) by education. According to the results of Scheffe test, the greatest difference at intermediate level IT skill is between high school and doctorate groups.

Table 9 has shown One - Way ANOVA test results of IT scales by cadre variable.

Table 9: One - Way ANOVA Test Results of IT Scales by Cadre Variable

		N	Mean	S. D.	F	df	Sig.
Intermediate Level IT Skill	Academic staff	278	1.8903	.8928	17.176	446	.000
	Administrative staff	146	2.4795	1.1543			
	Both academic and managerial staff	23	1.9783	.9352			
	Total	447	2.0872	1.0230			
Advanced Level IT Skill	Academic staff	278	2.6665	.9559	6.444	446	.002
	Administrative staff	146	3.0093	1.0160			
	Both academic and managerial staff	23	3.0083	1.0091			
	Total	447	2.7960	.9905			
Positive Attitude Towards IT	Academic staff	278	2.0866	.6009	1.670	446	.189
	Administrative staff	146	2.1142	.7085			
	Both academic and managerial staff	23	1.8533	.6026			
	Total	447	2.0836	.6391			
Negative Attitude Towards IT	Academic staff	278	2.0442	.7874	9.240	446	.000
	Administrative staff	146	1.7754	.6417			
	Both academic and managerial staff	23	1.5739	.5856			
	Total	447	1.8528	.7028			
The Use of IT for Entertainment Purpose	Academic staff	278	3.3050	.7378	4.610	444	.010
	Administrative staff	144	3.5452	.9417			
	Both academic and managerial staff	23	3.2222	.7785			
	Total	445	3.3784	.8179			
The Use of IT for Management Purpose	Academic staff	171	1.7227	.6173	3.803	336	.023
	Administrative staff	144	1.5399	.6049			
	Both academic and managerial staff	22	1.5341	.5991			
	Total	337	1.6323	.6160			
The Use of IT for Education Purpose	Academic staff	277	2.5250	.8232	9.418	351	.000
	Administrative staff	53	1.9874	.8560			
	Both academic and managerial staff	22	2.3409	.8916			
	Total	352	2.4325	.8522			

As represented in Table 9, there is no significant difference between academic staff and administrative personel at *"positive attitude towards IT"*

F (2, 444 = 1.670, p > .05). However, there are significant differences at *"intermediate level IT skill"* F (2, 444 = 17.17, p < .001), *"advanced level IT skill"* F (2, 444 = 6.444, p < .01) , *"negative attitude towards IT"* (2, 444 = 9.240, p < .001), *"the use of IT for practice / entertainment purpose"* F (2, 442 = 4.610, p < .05), *"the use of IT for management purpose"* F (2, 334 = 3.803, p < .05), and *"the use of IT for education purpose"* F (2, 349 = 9.418, p < .001) by cadre. According to Scheffe test results, the greatest difference is between academic staff and administrative personel at scales having significant differences.

5. CONCLUSION

IT is becoming increasingly important for institutions in the age of information. IT has provided a competitive advantage institutions as well as organizations. IT also offers opportunities to follow changes and developments in the world. Evaluating their internal environments through IT, institutions can see advantages and weaknesses. In addition, by observing the external environment, they can evaluate the opportunities and threats.

IT affects institutions as a whole. In other words, all staff –from lower level employees to top level managers- are affected by these technological changes. Therefore, employees must have the ability to use IT as part of the institution. In addition, managers should develop themselves to use IT for managerial tasks because IT provides them important contributions from planning to controlling. Even when performing the activities of teaching, academics are able to use IT intensely. However, employees do not use only IT institutional tasks, but they also use it in order to facilitate their pratical lives. However, employees can't exactly use IT depending on their individual qualifications due to rapid changes in technology. In other words, they may prevent the integration of IT with institution.

Activity theory can be a roadmap for the integration of IT with the institution because the activity system guides the institution through the items. Each institution can create itself an activity system depending on the tools used and the problems lived. Managers can holistically approach their institutions with activity system because the activity system deals with the institution in terms of both the internal environment and the external environment. Taking into account the institution's internal environment, the researcher has created an activity system in this study. She placed IT in the activity system as the tools. Object is problems, contradictions, and conflicts that adversely affect the functioning of the system. The researcher accepted as object the fact that managers, academics, and officials can't use exactly IT. The purpose is to integrate IT with the activities of the institution by solving this problem. Managers were evaluated as the subjects. All IT users in the institution including managers are the community of the system. Rules are restrictions set by management for effective use of IT. Finally, division of labor is the distribution of IT - related tasks among staff.

In this study, the researcher developed three scales and the subscales. IT skill scale is composed of *"intermediate level IT"* and *"advanced level IT"* subscales. IT attitude scale is composed of *"positive attitude towards IT"* and *"negative attitude towards IT"* subscales. IT use scale consists of *"the use of IT for management purpose"*, *"the use of IT for education purpose"*, and *"the use of IT for practice / entertainment purpose"* subscales. When researcher examined the relationship among subscales, she found a high level positive correlation between *"intermediate level IT skill"* and *"advanced level IT skill"* subscales. In other words, when intermediate level IT skill increases, advanced level IT skills also increase. She saw that there was a high level negative relationship between *"intermediate level IT skill"* and *"negative attitude towards IT"* subscales. Accordingly, when intermediate level IT skill increase, negative attitude towards IT also decreases.

When the researcher evaluated IT scales in terms of the participants' demographic characteristics, she obtained the following results: Men have more advanced level IT skill than women. In order words, men use IT at a more advanced level. If men can use their advanced level IT skills in institution, they contribute more to the integration of IT with institutional activities than women.

The researcher has found that there are significant differences among groups based on participants' ages both in intermediate level IT skill and in advanced level IT skill. The biggest difference is between 20-28 age group and 46-60 age group. IT skills of staff in the young age group is higher than in the older age group. In other words, younger staff can contribute greater integration of IT with institutional activities. On the other hand, she found that there were significant differences in terms of negative attitudes towards IT among the age groups. The participants in 46-60 age group have the highest negative attitude towards IT. Therefore, they contribute less the integration of IT with institutional activities. Finally, she found that there were significant differences among the age groups in terms of *"the use of IT for management purpose"*, *"the use of IT for education purpose"*, and *"the use of IT for practice / entertainment purpose"*. The participants in the 20-28 age group are people who most use IT for management, education, and practice / entertainment purposes. They can contribute to greater the integration of IT with institutional activities because they use IT as a multi-purpose.

The researcher found that there were significant differences among education groups both in intermediate level IT skill and advanced level IT skill. The biggest difference is between high school and graduate education. Graduate trained participants can contribute more to the integration of IT with institutional activities because they use IT better. When the researcher evaluated participants' positive attitudes towards IT, she found that the master-trained participants had the highest positive attitude towards IT. Therefore, the master-trained participants can contribute to greater integration of IT with institutional activities.

Finally, the researcher saw that there were significant differences in *"intermediate level IT skill"*, *"advanced level IT skill"*, *"negative attitude towards IT"*, *"the use of IT for management purpose"*, *"the use of IT for education purpose"*, and *"the use of IT for practice / entertainment purpose"* according to the participants' cadre status. Academic staff were higher than the administrative staff both in intermediate level IT skill and in advanced level IT skill because while the administrative staff were using computers more for simple and routine transactions related to their jobs, academicians were obligated to use IT for more complex operations due to their professions. Therefore, the academic staff can contribute greater to the integration of IT with institutional activities. On the other hand, the participants in the academic cadre have a less negative attitude towards IT. Staff in both academic and administrative cadre have used more IT for management and practice / entertainment purposes.

The researcher evaluated IT in terms of activity theory only by the internal environment. Therefore, she has developed the activity system according to institutional factors. However, there are many systems interacting with each other in institution's external environment. Therefore, researchers can examine networks consisting of interaction of many systems in the context of activity theory.

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